ditions, the appearance of the object is stellar. An examination of it on November 1, by Professor Barnard, with the 40-inch telescope at Yerkes Observatory, did not disclose any true disk but showed certain focal peculiarities similar to those of novae in some of their earlier stages. Photographs by Mr. van Maanen on October 17th in the 80-ft. focus of the 60-inch with exposures of 30 sec., 3 min. and 15 min. do not show a nebular disk or any other striking peculiarity. On the spectrograms for which the star was held as nearly as possible on the center of the slit, the nebular lines do not extend farther from the center of the spectrum than do portions of the continuous spectrum (allowing for photographic effects). The radial velocities yielded by the nebular lines are about the same as those from the Md spectrum. An apparent tendency of the chief nebular lines N1 and N2 and Hβ to give algebraically greater velocities than the other bright lines, requires further investigation. To the above evidence for the identity of source of the nebular and the Md spectra may be added the consideration that if the nebular lines are derived from an object which is independent of the variable star but on the line joining it to the Earth, then such an object should have been discovered before this as a planetary nebula.

November 12, 1919. PAUL W. MERRILL.

NOVA OPHIUCHI

Two spectrograms of the new star found by Miss Mackie and announced in the *Harvard Bulletin* No. 696, were obtained on the nights of November 1st and 2nd. The first was taken with the 60-inch telescope and 7-inch camera and the second with the 100-inch telescope and 18-inch camera, using a single prism in both cases. The star was apparently about the 9th magnitude and the exposure satisfactory.

The photograph taken with the 100-inch reflector and higher dispersion shows a large amount of detail which is yet to be examined. In general the spectrum is characteristic of new stars in the earlier stages. The bright bands of hydrogen and H and K of calcium are strong and well defined. There are many less prominent bright bands at λ5015, 4922, 4500-4700, 4233 and perhaps others more faint. The nebular bands have not appeared. A large number of strong and easily measured absorption lines, corresponding for the most part to those in the spectrum of α *Cygni*,

appear from preliminary measures by Miss Burwell to be displaced 4.3 Angstroms to the violet.

The spectra are very similar to those of *Nova Aquilae* III taken on June 10 and 11, 1918, except in the width of the bright bands and the displacement of the absorption spectrum. The width of the bright bands is 8.5 at Hγ, and the displacement of the absorption lines is 4.3 Angstroms in *Nova Ophiuchi* as compared with a width of 46 Angstroms and a displacement of 23.6 Angstroms in *Nova Aquilae*. The bright bands are more numerous in *Nova Ophiuchi*.

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THE SPECTRA OF TWO ALGOL VARIABLES OF LONG PERIOD

SX *Cassiopeiae* ($0^h5^m.5$; $+54°20'$: 1900) and RX *Cassiopeiae* ($2^h58^m.8$; $+67°11'$: 1900), with periods of 36.5 and 32.3 days, respectively, which have been suspected of belonging to later spectral classes than most of the Algol variables, have been observed by us for the determination of the absolute magnitude. The very low density of these stars as computed by Shapley[1] makes them of especial interest.

The spectrum of SX *Cassiopeiae* on five plates taken with the 100-inch telescope and 18-inch camera shows only one component and the range in velocity is about 75 kilometers. The spectrum is very much like that of α *Cygni* with many rather poorly defined enhanced lines and hydrogen lines of moderate strength. Some 40 lines have been measured and found to be identical in almost every case with those of α *Cygni*. The star will be followed further with a view to the investigation of its orbit.

The spectrum of RX *Cassiopeiae* is very similar to that of W *Serpentis*[2] which has heretofore been classed among the Cepheid variables but which also has a symmetrical light curve. The hydrogen lines Hβ, Hγ and Hδ are bright with the centers reversed. The red edges are stronger than the violet and Hβ is the strongest of the three lines. In other respects the spectrum seems to be of type G3. Two plates taken with the 60-inch telescope and 7-inch camera show a range of 11 kilometers from maximum to minimum of light. The spectrum of only one component is shown.

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[1] *Contributions from the Princeton Observatory*, No. 3, 1915.
[2] *P. A. S. P.* **30**, 306, 1918.